

Evaluation of the Built Environment at a Children's Convalescent Hospital: Development of the Pediatric Quality of Life Inventory[™] Parent and Staff Satisfaction Measures for Pediatric Health Care Facilities

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ABSTRACT. In preparation for the design, construction, and postoccupancy evaluation of a new Children's Convalescent Hospital, focus groups were conducted and measurement instruments were developed to quantify and characterize parent and staff satisfaction with the built environment of the existing pediatric health care facility, a 30-year-old, 59-bed, long-term, skilled nursing facility dedicated to the care of medically fragile children with complex chronic conditions. The measurement instruments were designed in close collaboration with parents, staff, and senior management involved with the existing and planned facility. The objectives of the study were to develop pediatric measurement instruments that measured the following: (1) parent and staff satisfaction with the built environment of the existing pediatric health care facility, (2) parent satisfaction with the health care services provided to their child, and (3) staff satisfaction with their coworker relationships. The newly developed Pediatric Quality of Life Inventory[™] scales demonstrated internal consistency reliability (average $\alpha = 0.92$ parent report, 0.93 staff report) and initial construct validity. As anticipated, parents and staff were not satisfied with the existing facility, providing detailed qualitative and quantitative data input to the design of the planned facility and a baseline for postoccupancy evaluation of the new facility. Consistent with the a priori hypotheses, higher parent satisfaction with the built environment structure and aesthetics was associated with higher parent satisfaction with health care services ($r = .54$, $p < .01$; $r = .59$, $p < .01$, respectively). Higher staff satisfaction with the built environment structure and aesthetics was associated with higher coworker relationship satisfaction ($r = .53$; $p < .001$; $r = .51$; $p < .01$, respectively). The implications of the findings for the architectural design and evaluation of pediatric health care facilities are discussed. *J Dev Behav Pediatr* 25:10–20, 2004. Index terms: *built environment, satisfaction, healing environment, health care, pediatrics, children, Pediatric Quality of Life Inventory[™], postoccupancy evaluation, assessment.*

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Health care providers, architects, landscape designers, and hospital administrators, among others, have come to believe that the hospital built environment can affect the mood, stress level, and perceived overall satisfaction of patients, families, and staff.¹⁻³ The expectation that the hospital built environment may affect the health and satisfaction of patients and their families has attracted renewed interest in the medical literature as health care providers and hospital administrators have endeavored to differentiate and distinguish the quality and health outcomes of their health care services.⁴⁻⁶ Consistent with the growth of the consumer movement within health care, there has been a strong and growing advocacy to measure patient and staff satisfaction with the built environment of adult health care facilities.⁷⁻⁹ In addition to the possible benefits to the patient, family, and staff of an optimally designed built environment, the potential that pleasant, user-friendly facilities will attract patients and improve their health care satisfaction and facilitate recruitment and retention of health care staff has been advocated as a strategic initiative in the increasingly competitive health care industry.^{3,10,11}

There is some evidence that the hospital built environment may influence patient and family perceptions of their health care provider, as measured by health care satisfaction, quality assessments, intentions to return, and willingness to recommend a health care provider to others.^{3,11} Staff satisfaction with the built environment has also been found to be positively related to such factors as general well-being, job satisfaction, and staff retention, both in health care and industry.^{7,12-14} This association is particularly important in health care, in which patient and staff interactions can affect not only patient satisfaction but also patient well-being.⁷ However, empirical efforts to measure parent and staff satisfaction with the pediatric health care built environment have been relatively few in comparison.¹⁵⁻¹⁸

To design pediatric health care facilities that may result in built environments that potentially have positive effects on mood, health, and satisfaction, it seems essential to involve the users of these facilities in the design process.¹⁶ Because it is often an individual's perceptions of the built environment that influence the potential healing effects,¹ accurately measuring users' preferences for built environment spaces may be a necessary condition to optimize pediatric health care facilities' impact on patients, families, and staff.¹⁶

From a theoretical perspective, Lawton¹⁹ has proposed an environmental taxonomy to enhance conceptually driven assessment, in which there are universal dimensions that are applicable across settings, even though the content of the measures may be specific to a particular setting or microenvironment. This environmental taxonomy includes the physical environment dimension, as well as the interpersonal environment dimensions that are delineated into personal, small-group, suprapersonal, and megasocial environments.¹⁹ For the purposes of the present study, we were primarily concerned with the subjective appraisal of the physical or built environment, which consists of the evaluation of the objective physical environment from an individual's perceptions.¹⁹ We were also interested in the association between the satisfaction with the physical envi-

ronment and satisfaction with aspects of the interpersonal environment as measured by parent satisfaction with the health care services provided and staff satisfaction with coworker relationships.

The development of standardized measurement instruments to assess patient, family, and staff perceptions of the built (physical) environment using scientifically valid methodology is a necessary component in the evaluation process.²⁰ Well-developed measurement instruments for evaluating the built environment of adult health care facilities exist in the literature.^{19,21-24} However, as Shepley and colleagues state, "most of the existing design research is focused on adult environments and cannot be applied confidently to children's environments" (p. 248).¹⁶

Health care providers, architects, and hospital administrators are concerned not only with improving patient, family, and staff health and well-being through hospital design but also with documenting the value of health care design. Outcomes measurement is essential to achieving these goals of evidence-based design.³ Outcomes measurement provides critical information regarding the effectiveness of health care design and is an essential component of health care facilities' improvement strategies.

Consequently, the objectives of the present investigation are to describe the measurement properties of newly developed instruments designed to assess parent and staff satisfaction with the built environment of a pediatric health care facility and to test the association of satisfaction with the built environment with parent satisfaction with health care services and staff satisfaction with coworker relationships. We hypothesized that parent and staff satisfaction ratings of the built environment would be quite low given that the existing facility was both old and initially built to serve adult patients in a convalescent hospital more than 30 years ago. It was anticipated that staff satisfaction with the built environment would be lower than parent satisfaction given that staff worked in the physical environment on a regular basis. On the basis of the existing literature from adult health care facilities cited previously, we hypothesized that higher satisfaction with the built environment would be associated with higher parent satisfaction with health care satisfaction and higher staff satisfaction with coworker relationships. Finally, we present some descriptive links between specific items on the built environment satisfaction instruments with architectural design changes as illustrative of the potential utility for future pediatric health care design projects.

METHODS

Rationale for the Current Study

The commitment to a healing environment at the Children's Hospital and Health Center, San Diego, began with the idea of a garden envisioned by the Hospital's Bereavement Committee in the late 1980s. In 1993, with the creation of a Healing Environment Steering Committee, the focus of the garden shifted and it became part of an overall healing environment program. The definition of the healing environment that guided these efforts is summarized as follows (adapted from Whitehouse et al³):

"The Healing Environment is a term used to describe the physical and cultural atmosphere created to support families through hospitalization, medical visits, healing and bereavement. Guiding the Healing Environment is the desire to develop a space that engenders feelings of peace, hope, joy, reflection, and solace and one which provides opportunities for relaxation, enrichment, spiritual connection, humor, and play. The cornerstones of the Healing Environment are building design, the arts, family support, and staff attitudes. Physical components of the Healing Environment are the interior and exterior building designs, gardens, family spaces, the art collection, and the like."

Facility

The Children's Convalescent Hospital (CCH), located on the campus of Children's Hospital and Health Center, San Diego, has been in existence for more than 30 years. It is a licensed 59-bed, long-term, skilled nursing facility dedicated to the care of medically fragile children with complex chronic conditions, such as severe cerebral palsy and birth defects. It serves as home to the children who reside there, giving them opportunities to attend school, participate in activities, and receive specialized services. The existing facility presents many functional problems because it was originally designed to serve adult patients in a convalescent hospital. Therefore, the decision was made to build a new facility.

In preparation for the design, construction, and post-occupancy evaluation of the new CCH, we conducted focus groups and developed measurement instruments tailored to quantify and characterize parent and staff satisfaction with the built environment of the existing facility, parent satisfaction with health care services, and staff satisfaction with coworker relationships.

Participants

Parents of children who were residents of the CCH and the staff at CCH were invited to participate in the study. Of the 59 pediatric residents at the CCH, 40 of their parents (68%) responded to the questionnaires. Of the 99 staff members at the CCH, 72 (73%) responded to the questionnaires. The children who were residents of CCH were not included as participants in the study given the extreme severity of their chronic health conditions. Medically fragile children with complex chronic conditions are generally characterized as significantly developmentally disabled. Their severe and/or multiple disabilities typically include limited speech and communication, significant cognitive impairment, difficulty in physical mobility, and substantial sensory losses. These children require extensive support in the major activities of daily living. Consequently, the residents of CCH were not developmentally able to be participants in the focus groups or respondents in the survey research protocol.

PROCEDURE

The measurement instruments were designed in close collaboration with parents, staff, and senior management

involved with the existing and planned facility. The modules developed for this study followed the Pediatric Quality of Life Inventory[™] (PedsQL[™]) instrument development methodology previously used,²⁵⁻²⁸ which consists of a review of the existing literature, focus groups and individual focus interviews, item generation, cognitive interviewing, pretesting, and subsequent field testing of the new measurement instrument in the target population.²⁹⁻³¹

Focus Group Methodology

Focus groups have long been widely used as a methodology for developing items for standardized questionnaires.^{30,32} Focus groups generate qualitative data that provide insights into the attitudes, perceptions, and opinions of participants solicited through the open-ended question-and-answer protocol.³³ Focus group interviews help the researcher discover the vocabulary and thinking patterns of the target group before the development of quantitative standardized items for survey questionnaires. Focus groups also alert researchers to issues that might have otherwise been missed.

For the study, focus groups were conducted separately for the parents and staff at the Children's Convalescent Hospital (CCH). Eleven parents participated in the parent focus group, and 26 staff members participated in the staff focus group. Parent participants were determined in part by their proximity to the hospital and consequently represent a convenience sample. Staff participants also constituted a convenience sample, composed of individuals who expressed an interest and were available for participation during nonworking hours.

During each focus group, two facilitators used a semi-structured interview format with open-ended questions to elicit group participation and discussion on specific topic areas. Topic areas were selected based on the extant literature. The focus groups lasted approximately 2 hours. Once the focus groups were completed, we then proceeded to develop the scale items.

Generation of Items

Items were generated from a review of the existing literature, the parent and staff focus groups' coded qualitative information, and discussions with health care providers at CCH and senior management. Items were organized into scale domains based on the conceptualization of the pediatric health care environment and included multiple dimensions of the health care built environment and health care satisfaction. It was the intent of the standardized instrument and survey methodology to increase the representation of parents and staff than is typically feasible in focus groups.

MEASUREMENT INSTRUMENTS

Built Environment Modules

The instructions for the parent surveys asked the respondents to "Please answer the following questions telling us how happy you are with the structure, services, and overall

facility at Children's Convalescent Hospital (CCH). Please tell us how happy you are with each item by circling 0 if you are never happy, 1 if you are sometimes happy, 2 if you are often happy, 3 if you are almost always happy, and 4 if you are always happy." Not applicable was also provided as a response option. The instructions for the staff surveys were similar, using the same 5-point Likert-type scale response categories with the not applicable option.

The scales of the 18-item Built Environment Module-Parent Survey included 14 items measuring *Structure* (e.g., "The number of private areas where you can be with your child;" "The parking that is available;" "The amount of closet space in your child's room"), and four items measuring *Facility Aesthetics* (e.g., "The amount of natural light [i.e., from windows] in the Convalescent Hospital;" "The decoration of the interior of the Convalescent Hospital").

The scales of the 50-item Built Environment Module-Staff Survey included 18 items measuring *Structure* (e.g., "The size of the residents' showers;" "The size of doorways to accommodate wheelchairs;" "The space available for wheelchairs or other equipment;" "The size of the dining room;" "The wheelchair ramps;" "The size of the staff break room;" "The space available for wheelchairs or other equipment"). *Facility Aesthetics* was measured by 11 items (e.g., "The colors of the walls;" "The pictures in the hallways;" "The visual stimuli [i.e., fish tanks, interactive wall art];" "The lighting in the facility;" "The furniture in the facility;" "The windows"). *Work Environment* was measured by 21 items (e.g., "The availability of personal storage space;" "Access to employee restrooms;" "The availability of staff break rooms;" "Privacy to make sensitive phone calls;" "Storage for medical supplies"). Although there was some overlap between items on the parent and staff surveys, the staff surveys included more detail and more items reflecting the greater concerns they expressed during the focus group.

Health Care Satisfaction Module

The scales of the 30-item Health Care Satisfaction Module-Parent Survey were tailored for the Convalescent Hospital from our previous Pediatric Hematology/Oncology Parent Satisfaction survey³⁴ and included the following: six items measuring *Information* (e.g., "How much information is provided to you about your child's overall health condition"), four items measuring *Inclusion of Family* (e.g., "The sensitivity shown to your family during your child's stay at the Convalescent Hospital"), three items measuring *Technical Skill* (e.g., "How quickly the staff responds to your child's health needs"), three items measuring *Services* (e.g., "The kinds of sensory experiences [i.e., things your child can touch, see, and hear] provided for your child"), seven items measuring *Communication* (e.g., "How well the staff listens to you and your concerns"), four items measuring *Emotional Needs* (e.g., "How well the staff responds to your child's emotional needs"), and three items measuring *Overall Satisfaction* (e.g., "The overall care your child is receiving").

Staff Satisfaction Scale-Coworkers

The Staff Satisfaction Scale-Coworkers was measured by four items designed to assess staff satisfaction with co-worker relationships (e.g., "The openness of communication between staff").

Mail Survey Methodology

The newly developed parent and staff surveys were mailed to all 59 parents and 99 staff members, which included parents and staff who participated in the focus groups. The five steps of the mail survey methodology were based on the survey research literature^{35,36} and included the following: (1) mail the survey instrument and initial cover letter to selected recipients; (2) mail a reminder postcard 7 to 10 days later; (3) mail the survey instrument again and second mailing cover letter 1 to 2 weeks after sending the reminder postcard to all nonrespondents; (4) use a telephone reminder call approximately 3 weeks after the initial mailing to all nonrespondents; and (5) offer nonrespondents the option of a telephone interview at the 3-week reminder call.

Forty parents completed the parent survey, representing a 68% return rate. Seventy-two staff members completed the staff survey, representing a 73% return rate. These response rates are considered adequate to represent the population surveyed.^{35,36}

Statistical Analysis

Descriptive statistics on item-level and scale-level means, SDs, and range of measurement were computed. The 5-point (0–4) Likert-type scales for the response categories were linearly transformed into a 0 to 100 scale to facilitate interpretation of the results, with higher scores indicating greater satisfaction. Although linear transformation changes the means and SDs of the variables, they yield the same data relationships as the untransformed raw data.³⁷ Likert-type scales like these, which have a defined zero point, are treated as if they have approximately equal intervals, and as such may be analyzed using multiple regression and correlational parametric analyses.³⁷ These scoring algorithms are consistent with previous Pediatric Quality of Life Inventory[™] (PedsQL[™]) published research studies.^{26–28,38,39}

Scale scores were computed as the sum of the items divided by the number of items answered (this accounts for missing data). If more than 50% of the items in the scale were missing, the scale score was not computed based on published recommendations.⁴⁰ Scale internal consistency reliability was determined by Cronbach's coefficient alpha.⁴¹ A reliability of greater than 0.70 is recommended to compare groups, whereas a reliability of greater than 0.90 is recommended for comparing individuals.⁴²

Initial scale validity was determined in two ways. We hypothesized that parent and staff satisfaction ratings of the built environment would be quite low given that the existing facility was both old and initially built to serve adult patients in convalescent hospitals more than 30 years ago. It was anticipated that staff satisfaction with the built environment would be lower than parent satisfaction given

that staff worked in the physical environment on a regular basis. We also examined validity by computing the hypothesized associations between the satisfaction with the built environment and parent health care satisfaction ratings and staff coworker satisfaction ratings. We hypothesized that higher satisfaction with the built environment would be associated with higher parent satisfaction with health care services and higher staff satisfaction with coworker relationships. Computing the intercorrelations among scales provides initial information on the construct validity of an instrument.⁴³ Effect sizes for correlations are designated as small (0.10), medium (0.30), and large (0.50).⁴⁴ Statistical analyses were conducted with SPSS for Windows.⁴⁵

RESULTS

Descriptive Statistics

Tables 1 to 4 contain item-level and scale-level means, SDs, and ranges. Parents as a group were moderately satisfied with the Structure (mean = 74; SD = 25) and Facility Aesthetics (mean = 77; SD = 24) of the existing Children's Convalescent Hospital (CCH). Staff were generally very dissatisfied with the Structure (mean = 30; SD = 22), Facility Aesthetics (mean = 38; SD = 23), and Work Environment (mean = 33; SD = 22) of the existing CCH. These findings are consistent with the *a priori* hypothesis.

Parents were very satisfied with the overall health care provided (total scale mean = 90; SD = 14). Staff members were moderately satisfied with their relationships with coworkers (mean = 61; SD = 25).

Internal Consistency Reliability

Cronbach's alpha internal consistency reliability coefficients for these measurement instruments ranged from

0.82 to 0.97, averaging 0.92 and 0.93 for parents and staff, respectively, supporting the initial reliability of these newly developed scales (Tables 1–4).

Construct Validity

The intercorrelations among the scales of the instruments measuring the built environment with parent health care satisfaction and staff coworker relationship satisfaction were hypothesized to demonstrate a cross-sectional statistical relationship, with higher satisfaction with the built environment statistically predictive of higher parent satisfaction with health care services and staff satisfaction with coworker relationships. Parent satisfaction with the structure and facility aesthetics of the existing CCH was significantly associated with higher total scale health care satisfaction ($r = .54, p < .01$; $r = .59, p < .01$, respectively). Staff satisfaction with the structure of the existing CCH was significantly associated with higher satisfaction with coworker relationships ($r = .53; p < .001$). Staff satisfaction with the facility aesthetics ($r = .51; p < .01$) and work environment ($r = .45; p < .01$) was similarly significantly associated with higher satisfaction with coworker relationships (Table 5). All of these intercorrelations represent large effect sizes as designated by Cohen.⁴⁴ There were no statistically significant intercorrelations between parent and staff ratings.

Changes in Architectural Design

On the basis of the findings from the focus groups and mailed surveys, the planned CCH underwent a number of significant architectural design changes to address the responses of the parents and staff. Parents, for example, indicated low satisfaction with built environment items such as the space provided for showers and baths (mean = 69.56),

Table 1. Pediatric Quality of Life Inventory[®] Built Environment Parent Module: Item and Scale Analysis

Item	N	Mean	SD	Range
Structure ($\alpha = 0.97$)	39	74.23	25.26	20–100
1. The wheelchair ramps	39	90.38	15.83	50–100
2. The space provided for showers and baths	39	69.56	35.49	0–100
3. The family rooms/visitor rooms	39	75.64	28.96	0–100
4. The amount of closet space in your child's room	39	61.54	38.41	0–100
5. The air conditioning/heating system	39	81.41	21.24	25–100
6. The parking that is available	39	62.82	34.83	0–100
7. The number of private areas where you can be with your child	39	65.38	33.25	0–100
8. The outdoor recreation area	39	65.13	34.00	0–100
9. The location of the nursing station	39	67.95	39.71	0–100
10. The availability of phones to make calls	40	77.09	29.27	0–100
11. The privacy your child is given	40	82.50	20.57	25–100
12. The privacy you and your family have with your child	40	81.25	24.51	0–100
13. The pool	39	78.72	27.31	0–100
14. The efforts to make the Convalescent Hospital a home-like environment	39	81.41	25.47	25–100
Facility aesthetics ($\alpha = 0.89$)	39	77.24	24.14	6–100
1. The overall appearance of the Convalescent Hospital	39	85.26	22.00	0–100
2. The amount of natural light (i.e., from windows) in the Convalescent Hospital	39	70.51	31.87	0–100
3. The decoration of the interior of the Convalescent Hospital	39	79.49	26.82	25–100
4. The furniture in your child's room	39	73.72	29.77	0–100

0 = never; 100 = always.

Table 2. Pediatric Quality of Life Inventory[®] Built Environment Staff Module: Item and Scale Analysis

Item	N	Mean	SD	Range
Structure ($\alpha = .95$)	70	30.27	22.32	0–100
1. The size of the residents' closets	70	27.35	29.12	0–100
2. The size of doorways to accommodate wheelchairs	70	45.50	36.31	0–100
3. The size of the residents' showers	70	20.10	25.55	0–100
4. The size of the activity rooms	70	23.57	29.14	0–100
5. The size of the staff break-room	72	13.68	22.83	0–100
6. The size of the dining room	70	22.64	26.47	0–100
7. The size of the family room	71	34.86	30.90	0–100
8. The size of the classrooms	70	32.34	30.19	0–100
9. The size of the annex (program space)	71	33.55	30.87	0–100
10. The size of the housekeeping closet	70	30.66	27.84	0–100
11. The space available for wheelchairs or other equipment	70	14.64	24.26	0–100
12. The space available for charting	71	23.60	30.38	0–100
13. The wheelchair ramps	70	44.64	37.32	0–100
14. The outside recreation area/patio (for staff)	71	28.68	31.30	0–100
15. The outside recreation area/patio (for residents)	70	34.64	31.07	0–100
16. The location of the residents' showers	70	28.46	30.21	0–100
17. The location of the nursing station	71	43.22	31.03	0–100
18. The location of your working environment	71	42.96	36.51	0–100
Facility aesthetics ($\alpha = .92$)	71	38.12	22.59	0–100
1. The comfort of the staff break-rooms	71	15.88	23.63	0–100
2. The color of the walls	71	43.26	29.94	0–100
3. The pictures in the hallways	71	40.55	32.31	0–100
4. The visual stimuli (i.e., fish tanks, interactive wall art)	71	29.18	32.94	0–100
5. The sensory stimuli available for residents	71	39.59	30.45	0–100
6. The lighting in the facility	71	47.69	32.18	0–100
7. The flooring	72	49.51	31.95	0–100
8. The windows	71	43.39	30.49	0–100
9. The temperature in the residents' rooms	71	35.95	27.69	0–100
10. The furniture in the facility	71	36.91	39.53	0–100
11. Residents' access to live animals	71	38.13	30.85	0–100
Work environment ($\alpha = 0.96$)	72	33.13	21.86	0–100
1. The time spent waiting for the resident's showers	72	23.44	23.84	0–100
2. The availability of personal storage space	72	12.56	23.23	0–100
3. The availability of the staff break-rooms	72	19.19	25.13	0–100
4. The availability of kitchen appliances in staff break-rooms	72	26.33	28.42	0–100
5. Availability of private meeting space where employees can meet with parents, physicians, and/or others	72	31.98	28.45	0–100
6. Access to telephones	72	49.86	35.13	0–100
7. Access to employee restrooms	72	30.46	30.18	0–100
8. Access to network (Meditech)	72	40.35	30.65	0–100
9. Access to copy machine	72	43.56	33.75	0–100
10. Access to computers	72	41.29	33.82	0–100
11. Access to internet/electronic resources	72	30.41	29.06	0–100
12. Convenient access to inactive files	72	29.45	27.30	0–100
13. Desk space/writing surfaces	72	30.82	32.85	0–100
14. Storage for active files	72	32.08	28.82	0–100
15. Storage for discharge charts	72	30.40	27.05	0–100
16. Storage for medical supplies	72	32.74	28.94	0–100
17. Storage for work supplies	72	28.14	30.22	0–100
18. Privacy to make sensitive phone calls	72	32.87	36.25	0–100
19. The call system in the resident's rooms	72	46.83	33.64	0–100
20. The laundry facilities	72	43.29	31.72	0–100
21. The faucets in the residents' rooms	72	39.72	28.98	0–100

0 = never; 100 = always.

amount of closet space in their child's room (mean = 61.54), available parking (mean = 62.82), number of private areas where they can be with their child (mean = 65.38), outdoor recreation area (mean = 65.13), location of the nursing

station (mean = 67.95), and amount of natural lighting in the facility (mean = 70.51). As a result of this feedback, specific changes made in the architectural design of the planned facility include larger bathrooms with bath/shower;

a lower resident/bathroom ratio (one full bathroom with bath/shower per four residents); extra closet space in residents' rooms; increased parking spaces (5–80 spaces); a more spacious, comfortably furnished family room; a well-landscaped, centrally located, sunny outdoor recreation area; two nursing stations located in close proximity to residents' rooms (currently there is one nursing station in the lobby); garden-like areas adjacent to each bedroom providing natural lighting and a view of nature; and an in-

creased number of larger windows throughout the facility to allow for more natural lighting.

Staff members at CCH indicated low satisfaction with built environment items such as the size of residents' closets (mean = 27.35); the size of residents' showers (mean = 20.10); the size of the activity rooms (mean = 23.57); the size, comfort, and availability of the staff break room (mean = 13.68); the size of the dining room (mean = 22.64); the space available for wheelchairs/other equipment

Table 3. Pediatric Quality of Life Inventory[®] Health Care Satisfaction Parent Module: Item and Scale Analysis

Item	N	Mean	SD	Range
Information ($\alpha = 0.90$)	40	86.85	16.67	25–100
1. How much information is provided to you about your child's overall health condition	40	90.00	17.72	25–100
2. How often you are updated about your child's overall health condition (i.e., quarterly reviews)	40	92.50	16.21	25–100
3. How much information is provided to you about the treatment of your child's specific illnesses (i.e., pneumonia, temps, rashes)	40	85.63	19.52	25–100
4. How often you are updated about your child's specific illnesses (i.e., pneumonia, temps, rashes)	40	86.25	21.89	0–100
5. How soon information is given to you about your child's specific illnesses (i.e., pneumonia, temps, rashes)	40	82.50	23.48	0–100
6. How much information is given to you about the side effects of your child's treatment	40	84.25	23.05	0–100
Inclusion of family ($\alpha = 0.82$)	40	94.38	12.64	44–100
1. The sensitivity shown to your family during your child's stay at the Convalescent Hospital	40	93.13	13.85	50–100
2. The staff's willingness to answer questions that you or your family may have	40	96.25	10.67	50–100
3. The effort to include your family in discussions about your child's care and other information about your child's health condition	40	92.50	21.33	0–100
4. How much time the staff gives you to ask any questions you may have about your child's health condition and treatment	40	95.63	14.86	25–100
Technical skill ($\alpha = 0.96$)	40	88.75	17.46	33–100
1. How well the staff responds to your child's needs	40	88.13	17.89	25–100
2. Efforts to keep your child as comfortable as possible	40	88.75	18.73	25–100
3. How quickly the staff responds to your child's health needs	40	89.38	17.80	25–100
Services ($\alpha = 0.92$)	37	84.23	23.31	0–100
1. The outside activities planned for your child	38	84.21	28.13	0–100
2. The kinds of sensory experiences (i.e., things your child can touch, see, and hear) provided for your child	39	85.26	22.74	0–100
3. The massage therapy your child receives	37	81.76	27.42	0–100
Communication ($\alpha = 0.94$)	39	89.81	15.63	32–100
1. How well the staff explains your child's condition and treatment to you	39	92.30	15.34	50–100
2. How well the staff listens to you and your concerns	39	93.59	15.93	25–100
3. The preparation provided for you about what to expect during tests and procedures	39	88.33	18.11	25–100
4. The preparation provided for your child about what to expect during tests and procedures	39	87.16	19.66	25–100
5. How well the staff relates to your child during the day (i.e., talking to them during care and activities)	39	92.95	13.99	50–100
6. The notification you are given about your child's appointments	39	91.67	20.14	0–100
7. The communication between staff members regarding your child	40	82.50	22.79	0–100
Emotional needs ($\alpha = 0.94$)	39	88.94	17.60	17–100
1. The amount of time given to your child for recreational activities	39	89.10	19.70	22–100
2. How well the staff supports you in meeting your child's educational needs	39	90.38	19.55	0–100
3. How well the staff responds to your child's emotional needs	40	89.79	17.65	50–100
4. How well the staff responds to your emotional needs	40	86.46	19.22	25–100
Overall satisfaction ($\alpha = 0.90$)	40	92.29	13.13	50–100
1. The overall care your child is receiving	40	90.00	14.76	50–100
2. How friendly and helpful the staff is	40	95.00	12.91	50–100
3. The way your child is treated at the Convalescent Hospital	40	91.88	15.39	50–100

0 = never; 100 = always.

Table 4. Pediatric Quality of Life Inventory[™] Staff Satisfaction Coworker Module: Item and Scale Analysis

Item	N	Mean	SD	Range
Coworkers ($\alpha = .88$)	71	60.83	24.69	13–100
1. The relationship you have with your coworkers	71	72.18	24.11	0–100
2. The support given to you by your coworkers	71	68.31	27.37	0–100
3. The staff's responsiveness to change	71	50.35	30.62	0–100
4. The openness of communication between staff	71	52.46	32.50	0–100

0 = never; 100 = always.

(mean = 14.64); the space available for charting (mean = 23.60); the outside recreation area/patio (mean = 28.68); and the location of the residents' showers (mean = 28.46). Changes in the design of the facility to reflect this feedback include larger closets in residents' rooms; expansion of shower space in bathrooms; larger activity spaces; a separate, spacious staff break room; a large dining room to accommodate all residents; wheelchair storage built into each child's bedroom; extra storage space for other equipment; counter space at nursing stations for charting; a well-landscaped, sunny outdoor recreation area with additional seating and tables; and one full bathroom with a bath/shower for every four residents (currently there are only three common showers for 59 residents).

DISCUSSION

Although there are measures of the physical environment for children in the home and day-care settings,^{46,47} what has been missing, in large part, from the pediatric health care

built environment literature has been the development of reliable and valid outcome measures that assess perceived satisfaction with the pediatric health care environment following modern measurement instrument design and evaluation methodologies.^{16–18} In addition, research studies linking satisfaction with the pediatric health care built environment of an existing facility to design changes for a new, planned pediatric facility, and then to parent satisfaction with health care services and staff satisfaction with coworker relationships, and ultimately to health outcomes are generally lacking in the pediatric health care literature.^{16,17} A notable exception, although for a children's psychiatric facility, is Shepley's⁴⁸ study in which interviews and questionnaires were used to inform the design process of a new children's psychiatric facility.

The findings demonstrate that it is feasible to quantify and characterize the qualitative aspects of the pediatric health care environment using standardized instrument development methodologies. The results of the current study provide initial support for the measurement properties of the Pediatric Quality of Life Inventory[™] (PedsQL[™]) Built Environment Modules for parents and staff developed for evaluating the physical environment of pediatric health care facilities. The results indicate that parents were, for the most part, moderately satisfied with the built environment of the existing facility where their children were long-term residents. Although parents were moderately satisfied overall with the built environment, individual item analysis provided the specificity needed to determine which aspects of the existing facility were particularly problematic for parents, indicating opportunities for architectural design modifications in the planned new facility. Staff members, on the other hand, expressed a great deal of dissatisfaction with the built environment. As with the parent responses, an item-level analysis of the staff instrument provided specific information about the areas of particular concern. Individual item analysis can be used by an architectural design team to make tailored changes in facility plans to potentially increase satisfaction with the built environment of the future facility.

Table 5. Intercorrelations Among Pediatric Quality of Life Inventory[™] Built Environment Scales and Health Care/Coworker Satisfaction Scales

PedsQL [™] Scales	Structure	Facility Aesthetics	Work Environment	Built Environment Total Score
Parent report				
Total Score Health Care Satisfaction	0.537**	0.548**	—	0.599**
Information	0.400**	0.462*	—	0.454**
Inclusion of Family	0.296	0.310	—	0.343*
Technical Skill	0.535**	0.527**	—	0.604**
Services	0.767**	0.690**	—	0.821**
Communication	0.572**	0.550**	—	0.627**
Emotional Needs	0.592**	0.597**	—	0.653**
Overall Satisfaction	0.542**	0.537**	—	0.604**
Staff report				
Coworkers	0.534**	0.508**	0.453**	0.532**

Built Environment Total Scale Score is composite of Structure and Facility Aesthetics for Parents and Structure, Facility Aesthetics, and Work Environment for Staff. There were no significant intercorrelations among the parent and staff scales.

PedsQL[™], Pediatric Quality of Life Inventory[™].

*Correlation significant at the 0.05 level (2-tailed).

**Correlation significant at the 0.01 level (2-tailed).

The discrepancy between parent and staff satisfaction with the built environment supports the need to include measurement instruments specific to the users of the pediatric health care facility. In this long-term, pediatric health care facility, most parents were occasional visitors, whereas the staff experienced the problematic design features of the existing facility on an almost daily basis. Despite the overall differences in built environment satisfaction ratings between parents and staff, however, the use of a standardized measurement instrument provided a detailed item-level specificity that facilitated the subsequent architectural design changes that reflected the input from both parents and staff.

Finally, the intercorrelations among subscales on the instruments suggest that higher parent satisfaction with the built environment was associated with higher health care satisfaction, and that higher staff satisfaction with the built environment was associated with higher coworker relationship satisfaction. Given the cross-sectional design, causation cannot be determined.⁴⁹ However, the findings on the significant associations between satisfaction with the built environment and satisfaction with health care services and satisfaction with coworker relationships are consistent with recent findings in adult health care settings.⁵⁰

In addition to measuring satisfaction with the built environment, it is vital to empirically document the impact of the built environment on health outcomes given the increasing demands on health care resources and the need to allocate these scarce resources in the most cost-effective manner. To scientifically assess the healing potential of the hospital built environment (i.e., the color, light, sound, texture, and other structural design aspects of the facility), empirical documentation of the restorative aspects of the built environment on the healing process is essential.¹ Elements of the built environment are potential sources of perceived stress by individuals when these design elements are perceived negatively.^{21,51} Ulrich has written extensively on the stress-ameliorating effects of views of natural environments, including window views from patient hospital rooms,⁵² demonstrating a reduction in psychophysiological arousal in controlled experiments.^{51,53,54} For instance, Ulrich found that adult patients assigned to rooms with window views overlooking a nature scene, rather than window views of a brick building wall, had shorter postoperative hospital stays, received fewer negative evaluative comments in nurses' notes, and took fewer potent analgesics.⁵² These findings on the restorative influences of a natural scene, although provocative, have not yet been replicated for pediatric patients. Evans²¹ has also reviewed the measurement of environmental stressors that potentially impact health outcomes, including noise, crowding, and architectural elements. Further, Lazarus and Folkman's seminal research in stress and coping has demonstrated that an individual's appraisal or perceptions of the event rather than the event itself are predictive of the deleterious effects of stress on health and well-being.⁵⁵ Taken together, then it seems a reasonable hypothesis that a patient's perception or appraisal of the hospital built environment is a potent determinant of the patient's perceived stress during hospitalization and health care service delivery and may affect

both health outcomes and satisfaction, consistent with Ulrich's theory of supportive design.⁵⁶

The findings have potential implications for the design of pediatric health care facilities of the future. Patients, parents, and staff are critically important informants in the design of pediatric health care facilities. Their perceived needs for and satisfaction with the built environment can be rigorously, reliably, and validly assessed. The development of standardized measurement instruments allows for the comparison of different pediatric health care facilities' ability to meet the needs of children, their parents, and staff. The comparison of different pediatric facilities will enable the discovery and sharing of best-demonstrated practices in pediatric health care environmental design. The use of best-demonstrated practices can lead to the continuous improvement of pediatric health care architectural design, resulting in evidence-based design. Similar to evidence-based medicine, evidence-based design has the potential to improve the outcomes of pediatric patients through designing facilities that are reflective of empirical findings. Although the evidence for these benefits is accruing in adult health care facilities, the demonstration of these effects in pediatric health care facilities is just beginning,^{3,16} and may include reduced anxiety, pain, and other symptoms associated with the stress of medical procedures and medical settings.

The study has several potential limitations. Although the mail survey methodology resulted in a relatively high return rate, the sample limits generalizability of the findings to other pediatric health care facilities until further applications of these measures in other settings are conducted. Furthermore, because the mail survey was anonymous, we were not able to test any differences between participants and nonparticipants that may limit representativeness of the findings. Likewise, the sample size precluded the use of factor analysis to empirically derive the subscale structure.⁵⁷ In lieu of empirically derived scale structure, the conceptually derived scale domains were developed logically from the existing literature. Future research with larger sample populations will be needed to determine empirically the factor structure of the instruments. Pediatric patients were not included in the evaluation process. The children in the Children's Convalescent Hospital (CCH) were not able to be participants given the severity of their complex chronic health conditions. Future studies will benefit from the design of standardized instruments that are developmentally appropriate for pediatric patients in health care facilities.

Finally, it is important to remember the adage that "correlation does not prove causation."⁴⁹ Although we hypothesized that parents who reported higher satisfaction with the built environment would also report higher satisfaction with health care, the direction of this relationship cannot be fully specified in a cross-sectional study. It may be that parents who perceive that their child is receiving good health care are more likely to respond positively to questions about the built environment in which their child's care is received. Nevertheless, parents who responded to both the Health Care Satisfaction Module and the Built Environment Module showed variability in scores,

suggesting that they reported both satisfaction and dissatisfaction with elements of the built environment. Experimental and quasi-experimental designs will be required to explore this relationship further.⁴⁹

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Literary Quotes

The Fathers of the Founding Fathers: Josiah Franklin

We often marvel that the 13 struggling British colonies in America with a total population of only a few million were able to yield such an impressive group of representatives who produced the Declaration of Independence in 1776 and the Constitution in 1787. Undoubtedly, the factors were multiple. At least three of the founding fathers, Thomas Jefferson (see JDBP. 2002;23:352), Benjamin Franklin, and John Adams, had fathers with an intense interest in the education of their sons. Although they were minimally educated, they had seen to it that their promising sons received the best of what was available.

Josiah Franklin, the father of Benjamin Franklin (1706–1790), decided he should handle this son differently from his other children because of his obvious abilities. In his Autobiography (1791), Ben noted, "My elder Brothers were all put Apprentices to different Trades. I was put to the Grammar School at Eight Years of Age, my Father intending to devote me as the Tithe of his Sons to the Service of the Church." Ben did very well there for a year; but with Josiah's realization that college would be too expensive, the father sent him to a less advanced school for basic instruction in writing and arithmetic. Then, at 10 years, he was taken home to assist his father in his tallow chandlery. After two years of boredom for Ben while making candles, Josiah, recognizing Ben's "Bookish Inclination," apprenticed him to his brother James in the printing business. The result was that more and better books became available to his inquiring mind, and he made his first attempts at writing. His prospects were transformed. Would he have gone on to his celebrated accomplishments if he had been compelled to continue the drudgery of making candles with his father?

Noted by William B. Carey, M.D.